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ABSTRACT

The potential of online discussions to prompt greater reflection of course material is often stymied by a tendency of students to agree with one another rather than formulating counterarguments. This study reports an experiment using "note starters" and elaborated cases to encourage counterargumention. A note starter is a drop-down form field that requires students to choose a phrase with which to begin their response. Participants included 48 undergraduates who wrote online discussion notes in response to two issues in educational psychology. Participants also completed a personality survey, based on the five-factor personality model of R. McRae and P. Costa (1997). There was a significant positive main effect of note starters on the frequency of disagreement, as well as personality-treatment interactions between note started and several personality characteristics. The results suggest that note starters are most useful for students with low degrees of curiosity ("openness to Ideas") or assertiveness, and who are not overly anxious. Note starters appear to encourage students to consider other points of view during online discussions. (Contains 3 figures, 5 tables, and 50 references.) (Author/SLD)

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Enhancing the Quality of On-Line Discussions

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Abstract

The potential of on-line discussions to prompt greater reflection of course material is often stymied by a tendency of students to agree with one another rather than formulating counterarguments. This study reports an experiment using note starters and elaborated cases to encourage counterargumentation. Participants were 48 undergraduates who wrote on-line discussion notes in response to two issues in educational psychology. Participants also completed a personality survey, based on McCrae & Costa's (1997) five-factor personality model. There was a significant positive main effect of note starters on the frequency of disagreement, as well as personality-treatment interactions between note starters and several personality characteristics. The results suggest that note starters are most useful for student with low degrees of curiosity ("Openness to Ideas") or assertiveness, and who are not overly anxious. Note starters appear to encourage students to consider other points of view during on-line discussions.

Keywords: Technology, argumentation, computer-supported collaborative learning, personality.

Enhancing the Quality of On-Line Discussions

On-line discussions are increasingly being used to engage learners in dialogue about course topics (Bonk & King, 1998). Often conducted through Web-based discussion boards that accompany tools like Web-CT and Blackboard, the popularity of discussion boards in distance education has prompted some instructors to incorporate them into face-to-face courses. In such discussions, the instructor or a student posts an initial statement and then other students respond.

There is a need to better understand how discussion boards can encourage thoughtful dialogue that contributes to course goals. Although some have documented the potential of discussion boards to enhance student reflection (Murphy, Drabier, & Luepps, 1998), the quality of this reflection is often shallow. For example, an analysis of E-Mail discussion notes by Marttunen (1998) found students rarely disagreed or responded to one another's notes, and that the quality of their arguments were quite low. In a subsequent study, Marttunen and Laurinen (2001) found that over a 10-week period, when students were provided with extensive training in argumentation and practice engaging in argumentative discussions, they became better at supporting their arguments, but counterargumentation only improved in the face-to-face discussions. Likewise, in a review of on-line discussion systems, Veerman, Andriessen, & Kanselaar (1999) reported low-levels of disagreements with asynchronous systems (when notes are posted at different times). Too often, students simply repeat points that other classmates have made rather than adding to a discussion through disagreeing, framing counterarguments, or providing examples.

Like Marttunen, we believe that the quality of on-line discussions is related to the depth and complexity of the arguments raised. There is a small but growing body of evidence that links the complexity of arguments generated during discussions to learning outcomes (Alexopoulou & Driver, 1996; Chinn, O'Donnell, & Jinks, 2000; Coleman, 1998; Schwarz, Neuman, & Biezuner, 2000; Webb, 1995), improvements in writing skills (Reznitskaya et al., 2001) and better individual problem solving ability (Wegerif, Mercer, & Dawes, 1999). Not surprisingly, therefore, there is growing interest in designing computer interfaces that support various types of argumentation during on-line, collaborative learning (see, for example, Suthers, 1999). Although grounded in a slightly different context (children interacting while working on a computer), Mercer (1994) and colleagues (Fernández, Wegerif, Mercer, & Rojas-Drummond, 2002; Wegerif, Mercer, & Dawes, 1998, 1999) provide some evidence that productive argumentative discourse should not be disputational, where participants rigidly adhere to specific and opposing positions, but should still involve challenges for the sake of exploring different positions (see also Anderson, Chinn, Waggoner, & Nguyen, 1998; Nussbaum, 2002). This position is supported by research in science learning, which has found that *problem-centered* discussion moves (involving recognition of problems, formulation of questions, and the co-construction of explanations and arguments) results in greater learning than *surface moves* such as repeating, ignoring, or rejecting what others have said (Chan, 2001; Alexopoulou & Driver, 1996).

Possible Solutions

In light of this discussion, it is important to examine ways of enhancing the quality of on-line discussions to promote more problem-centered argumentation moves.

This study examines two interventions that may do so, specifically (a) note starters, and (b) elaborated cases.

Note starters. Note starters are a menu of phrases from which students choose when starting to write a note. Note starters are a form of scaffolding (Wood, Bruner, & Ross, 1976) intended to encourage students to think more deeply. King, Staffieri, & Adelgais (1998) and Coleman (1998) have researched face-to-face discussion scaffolds, but the use of scaffolds in on-line discussions was pioneered by Scardamalia & Bereiter (1991) in their CSILE system (now Knowledge Forum). They used such note starters as "My theory is...." or "I need to understand." The purpose of note starters is to encourage deep processing through the construction of explanations and arguments around conceptual principles, processes related to learning (Chi, de Leeuw, Chiu, & LaVancher, 1994, Webb, 1995).

In research with K-12 students, Scardamalia, Bereiter, & Lamon (1994) found that CSILE resulted in the generation of higher-level questions, more elaborated explanations, and deeper conceptual understanding. Whether these results were caused by note starters or other system attributes is unclear. It is therefore important to investigate how note starters function in other contexts, such as a Web-CT environment and among college students. Positive results would lend further evidence to the usefulness of note starters. Although Duffy, Dueber, and Hawley (1998) and Althauser and Matuga (1998) have incorporated note starters or similar devices into conferencing systems, no evaluation data were reported.

Elaborated cases. Another intervention that might produce deeper thinking involves elaborated cases, which are detailed scenarios about a classroom situation

contained in the initial problem statement. Cases may make the problem situation more meaningful to students and, by increasing engagement, increase the number of problem-centered moves. Furthermore, cases--by providing more detailed information and by activating background knowledge--may provide individuals with more material for constructing counterarguments. Support for this position is provided by research on the effects of video cases and anchored instruction (Cognition and Technology Group at Vanderbilt [CTVG], 1993, 1994), which--when used in small groups--appear to result in more argumentative disagreements, search of the problem space, and engagement with the problem (Vye, Goldman, Voss, Hmelo, Williams, and the CTVG, 1997). Although the cases used by the Vanderbilt group were extremely elaborate, we were interested in seeing if simplified cases would have a similar effect.

Personality variables. To better understand how individuals function in technological environments, there is growing interest in the role of individual differences in these environments (Hartley & Bendixen, 2001), including cognitive and personality variables. Although our conceptual framework is primarily cognitive, we also draw on personality theory to explain individual differences in students' propensity to disagree. Personality factors might also potentially interact with our treatment variables. We focus here on three traits from McCrae and Costa's (1997) five-factor personality model: (a) assertiveness (a facet of extraversion), (b) anxiety (a facet of neuroticism), and (c) openness to ideas. There are both theoretical and empirical reasons for focusing on these specific constructs. Infante and Rancer (1996) postulated that extraverts who are assertive may be more argumentative because they are more willing to advance their own ideas. This prediction was confirmed by a study by Nussbaum (2002) and another by

Nussbaum and Bendixen (2001), who also found that Openness to Ideas (a measure of curiosity) was linked to argumentativeness. Presumably, either an attraction to the world of ideas, or confidence in the veracity of one's own ideas, can increase one's tendency to disagree. In addition, Beatty, McCroskey, & Heisel (1998) report that trait-anxiety is linked to fear of communicating in public. We predict that individuals who are generally more anxious than other individuals may also be more afraid of disagreeing during argumentative discussions, perhaps because they may be concerned with (a) how the other party may react and/or (b) of being made to look foolish if they lose the argument. We therefore decided to include anxiety, in addition to assertiveness and openness, in our analysis of potential personality effects.

Methods

Participants

Participants consisted of 48 undergraduates who were enrolled in an introductory educational class. Students participated in the experiment in order to fulfill a course requirement. Most of the students were sophomores (35%) or juniors (52%); also, most were females (83%). On average, participants reported moderate levels of computer experience.

Design

Participants were randomly assigned to one of 12 small groups consisting of four or five students each. Using a 2 x 2 crossed design, each group was randomly assigned to one of four conditions: (a) with or without "note starters," and (b) questions or "elaborated cases."

Materials

The bulletin board used to facilitate the class discussion was designed in a manner similar to most bulletin boards currently being used on the Internet. The bulletin board facilitated a *threaded* discussion where reactions to one message were posted immediately below and slightly to the right of the original message. The bulletin board was also modified to include a "note starter" in the experimental conditions. This tool was simply a drop-down form field, which required students to choose a phrase with which to begin their response. Sample note starters included the phrases "on the opposite side," "I need to understand" and "my argument is." (See Figure 1 for the complete menu of note starters.) So that students would understand the purpose of the note starters, the menu was accompanied by a link that was labeled, "What is this?" When students clicked on this linked, they received the following explanation:

> These are message starters intended to help frame our discussion. Choose the message starter that most closely reflects the comments you would like to make.

Once a phrase was selected, it was automatically pasted into the response field. Figure 1 provides an illustration of the display for the note starter condition.

Discussion topics were also developed that related to the course curriculum (educational psychology). The topics pertained either to the importance of providing students with "background knowledge" or to whether high school teachers should consider sentence structure, grammar, and organization when grading essay exams, instead of only content. There were two versions of each topic: (a) a question version, and (b) an elaborated case version. In the question version, a discussion question was posed with a small amount of elaboration; in the elaborated case version, the question

was embedded in a paragraph-length case concerning a hypothetical teacher. For the *background knowledge* topic, the two versions were:

1. *Question*. One approach to teaching math suggests that appropriate student background knowledge can assist students in solving word problems while inappropriate background knowledge can actually get in the way of learning to solve this type of problem. For example, one might use children's knowledge of batting averages in baseball to teach them about fractions.

   Is this good educational practice? Give theory-based reasons to support your view.

2. *Elaborated Case*. Mr. Joseph eyed his 5th-grade class hopefully. He had been concerned that most of the students in his class struggled with even basic math concepts. It seemed that they weren't interested in math and they had little knowledge about it from their previous grades. In an attempt to try to address the situation, he planned to introduce the concept of fractions using word problems about baseball players' batting averages. He had just given the children a word problem in which they had to calculate the batting averages of ten famous baseball players given each player's number of at-bats and hits. He had used the statistics from real players to make the task more interesting.

   Is this good educational practice? Give theory-based reasons to support your view.

For the *grading essays* topic, the two versions were:

1. *Question*. Some high school teachers score essays based on content AND quality of writing. They let the students know, in advance, that this is part of the scoring criteria. For example, a student could include all of the proper content on an essay exam in history and still get a C on it because the teacher wants correct sentence structure, grammar, and organization. Is this a legitimate way of grading essays for an exam? Why/Why not?

2. *Elaborated Case*. Ms. Mulholland, an excellent 10th-grade history teacher, has just returned her students first essay exam. Ms. Mulholland makes no bones about the fact that to receive an A on her essay exams students must not only include the proper content but must also include correct sentence structure, grammar, and organization. She lets the students know this about her scoring criteria ahead of time. Is this a legitimate way of grading essays for an exam? Why/Why not?

In addition to the discussion questions, an on-line survey was developed using questions drawn from Costa and McCrae's (1992) NEO-PI personality inventory (Form R). Included were 48 items measuring extraversion, such as "Other people often look to me to make decisions." Another 48 items measured the Openness to Experience factor, which reflects curiosity about an individual's external and internal world (Costa & McCrae, 1992, p. 15). Finally, we included the 8-item anxiety subscale from their Neuroticism factor, which included such items as "I often worry about things that might go wrong." Accompanying each item was a 5-point Likert scale.

Procedures

Data collection occurred in two parts: collection of the individual difference data, and the bulletin board discussions. Because both sets of data were collected via the Internet, times and locations for data collection were at the discretion of the participants, provided that they met all established deadlines.

To ensure that participants' completion of the survey data would not be affected by any expectations or experiences regarding the discussions, we first had participants complete the on-line survey before presenting them with detailed information about the bulletin board discussions. Participants were first given one week—near the beginning of the semester--to respond to the survey, which required approximately 30-60 minutes to complete. Participants were then randomly assigned to discussion groups, each consisting of 4-5 students. Approximately midway through the semester, when students were being introduced to information-processing and schema theory in their educational psychology class, the instructor posted the background knowledge topic to the bulletin board. During the subsequent week, each student was required to compose a thoughtful

response. Then, during the next following week, each student was required to read and respond to the other group members' responses. Thus, in a group of four students, each student would need to post four messages, one initial response to the question and three responses to the other group members' initial posting. The same procedure was repeated several weeks later for the scoring essays topic.

Analysis

Because we were primarily concerned with how students agreed or disagreed with one another, we only analyzed messages that were a response to a peer. Students' initial responses to the topic posted by the instructor were not coded. A preliminary inspection of the data indicated that when students disagreed, they frequently did so by first agreeing with some point made by their peers. So that we could quantify this behavior, our coding system distinguished between flat disagreement and qualified disagreement. On the agreement side, it distinguished between agreement that merely restated points made in a peer's note and responses that added a new, independent reason. By independent, we mean a reason that was not simply an extension of the peer's argument but rather a totally new argument that could stand on its own. In summary, the codes used were:

(1) Agrees with peer but only restates conclusion or argument.
(2) Agrees with peer and adds a new, independent reason.
(3) Disagrees with peer, but disagreement is prefaced by agreement.
(4) Flat disagreement with peer.

Two raters coded a subset of 51 notes, and the percent of agreement was found to be acceptable (86%). Any disagreements were resolved through discussion.

Table 1 shows the frequencies of the various codes. It is clear that students tended to agree much more than disagree ($\chi^2 (1, N = 310) = 32.26, p < .001$). Furthermore, qualified disagreement was much more common than flat disagreement ($z =$

5.88, $p < .001$). Although this was an interesting finding, we decided for subsequent analysis to collapse the codes into two categories, (a) agreement (codes 1 and 2) and (b) disagreement (codes 3 and 4). The rationale for this decision was both theoretical and empirical. Theoretically, we were interested in the more superordinate categories of agreement and disagreement, because both qualified and flat disagreement can be useful for enriching discussions. Empirically, an inspection of the means in Table 2 indicated higher means in the note starter condition for both subcategories of disagreement (codes 3 and 4), so there seemed little reason to maintain the distinction, at least initially, between flat and qualified disagreement. Collapsing also simplified the analysis. Because each participant composed several responses on each topic (one responding to the initial posting of each group member), we computed an average disagreement score for each topic, which ranged from 0 (consistent agreement) to 1 (consistent disagreement).

Results of a 2 x 2 (Note Starters x Case) ANOVA, with topic as a repeated measure, indicated a significant main effect of note starters, $F(1, 37) = 4.06$, $p = .05$, $\eta^2 = 0.10$. There was also a significant interaction between note starters and topic $F(1, 37) = 4.60$, $p < .05$, $\eta^2 = 0.11$. The results are shown in Table 3. Analysis of the means for each condition indicated that note starters had a positive effect on increasing the amount of disagreement in the discussions, and that the effect was greater on the first topic, *background knowledge*.

We next turn to the question of whether note starters had a greater effect for some students than others. We did not use individual difference variables in the previous analysis because there were not a sufficient number of observations. Although use of the

average disagreement score simplified the statistical analysis, it also drastically reduced the number of cases and therefore statistical power. A more powerful analysis would treat the code for each note as a separate case. There were an uneven number of notes for each student because of slight variations in group size (i.e., number of notes to respond to) and some variation in full and timely completion of the assignment. Given the unbalanced design and the incorporation of interval-level covariates, we used regression analysis to test for interaction effects between the covariates and treatment variables.

We began by computing scores for the following three variables: Openness to Ideas, Assertiveness, and Anxiety. Each of these variables was composed of an 8-item subscale from the personality data. Dummy variables were used to code the note starter and case treatments. Personality x Treatment terms were then computed (six in all), along with a Note Starter x Case term. Three-way interaction terms were also computed using Note Starter x Case x Personality. Because of the large number of terms involved (16 in all), and to avoid possible multicollinearity, which would also reduce statistical power, we used forward stepwise regression to build the model. The resulting model, however, included one interaction term (Note Starters x Anxiety) without a term for the main effect of Anxiety, rendering the interaction term difficult to graph or interpret. We therefore included a simple Anxiety term in the final model. The results are shown in Table 4.

In the final model, the main effect of note starters was large and highly significant ($\beta = 1.48$, $t(304) = 4.56$, $p < .001$). The slopes for Anxiety and Openness to Ideas were both positive, but only the latter was significant ($\beta = 0.19$, $t(304) = 2.45$, $p < .02$). More importantly, however, there were two significant personality interactions with the use of

note starters: Anxiety x Note Starters (β = -0.74, $t(304)$ = -3.36, $p \leq .001$) and Openness to Ideas x Note Starters (β = -0.67, $t(304)$ = -3.16, $p < .01$). In both cases, the slopes were negative, which means that note starters were less effective for students high in these personality traits and, conversely, more effective for students low in these personality traits. The pattern of results is shown in Figures 2 (Anxiety) and 3 (Openness to Ideas). Note starters appeared to encourage students who were not naturally curious and inquisitive (i.e., Open to Ideas) to consider opposing viewpoints. Students who were anxious, however, benefited less from note starters.

Finally, it is interesting to note that although Assertiveness x Note Starters was not included in the final model, it did show a similar trend as did the other personality-treatment interactions (β = -0.27, $t(303)$ = -1.58, $p < .12$). The slope coefficient was not as large (in absolute value) as the other interactions and was only marginally significant.

One limitation of the above analysis is that the dependent variable could not exceed 1 or be less then 0. At very low or high levels of the independent variables, the error variances could therefore not approximate a normal distribution. Although the General Linear Model is fairly robust against violations of this assumptions (Neter, Wasserman, & Kutner, 1990) and parameter estimates remain unbiased, it does create some loss of statistical power. We therefore thought it prudent to also conduct a logistic regression analysis, because logistic regression does not require normally distributed error variances and is more powerful and efficient than ordinary regression. In this type of analysis, the regression equation predicts the logit, which is the natural logarithm of the odds ratio, or ln[P/(1-P)], where P is the probability of a disagreement. A logistic regression was applied to the variables in the final model, as well as to Assertiveness (and

Assertiveness x Scaffolds, which previously was marginally significant). The results are shown in Table 5. The pattern of results is the same as in the previous analysis, except that Assertiveness x Scaffolds is now significant ($B = -0.134$, Wald = 4.81, $p < .03$).

DISCUSSION

Previous research showed a tendency for students at the collegiate level to often agree with one another during on-line discussions (Marttunen, 1998). Students often merely agree with one another or repeat what others have said without thinking deeply about the topic being expressed. In this study, note starters encouraged students to disagree and explore alternative viewpoints. This effect may have occurred because note starters encouraged students to make problem-oriented moves (Chan, 2001). Also, one of the note starter from which students could choose, "On the opposite side...," specifically cued students to disagree. The effect was greater, however, on the first question. We can only speculate as to the possible reason for this result, but possibly participants had greater knowledge of the second question; as students, many may have completed essays that were graded in part of the basis of grammar. They therefore may have needed less prompting to think of counterarguments on the second question.

Also of significance was that note starters interacted with all three personality variables. Note starters were particularly beneficial for students with low Openness to Ideas; such students are not naturally curious and may benefit from some prompting to think more deeply. Note starters were also beneficial for students low in assertiveness. Such students may have a tendency to "follow the crowd" rather than being the dominant member of a group, and again may benefit from some prompting to think independently.

Unfortunately, note starters appeared to prompt less disagreement among anxious students. Anxious students might be a bit afraid of how other students might react if challenged. Lampert, Rittenhouse, & Crumbaugh (1996) have noted that disagreeing with others during class discussions can potentially disrupt friendships and social relationships, especially if others lose face (Goffman, 1972). There is also the possibility that the challenger may lose face and be embarrassed if the challenger loses the argument. Theoretically, note starters help initiate arguments but really do nothing to help students win arguments or to save face during argumentative exchanges. Many theorists of classroom discourse (for example, Anderson et al., 1998; Keefer, Zeitz, & Resnick, 2000; Mercer, 1994) have noted that collaborative discourse, where students work together to construct and critique positions, usually results in richer discussions, and Nussbaum (2002) postulated that such discussions might be less intimidating to anxious or introverted students. In summary, note starters may be a useful way of stimulating reflective discussion, but we speculate that this may be especially true when teachers emphasize the importance of collaborative discourse.

Interestingly, the majority of disagreement that was observed in this study was qualified disagreement, when students first prefaced a disagreement with a point on which they agreed. For example, a common pattern was "**I agree** with you about X, **but**...." Qualified disagreement reflects a mitigated form of argumentation that balances a need for individuals to assert their ideas while protecting the social self-image (i.e., face) of the other party (Brown & Levinson, 1987; Wilson, Aleman, & Leatham, 1998), because the agreement confirms the competence of the other party. Such mitigated forms of disagreement may be learned at a young age, especially among females (Sheldon,

1992), and over 80% of our sample was female. Furthermore, less-assertive introverts have been found to use different argumentative styles the extraverts even when gender is held constant (Nussbaum, 2001, 2002), so most likely various types of students attend to the possible deleterious effect of disagreement on social relationships. Mitigating disagreement by prefacing it with agreement may have been one strategy used by students in the study to preserve harmonious social relationships.

Furthermore, the need of students to protect and nuture social relatiohships might also explain the overall general tendency of students to agree with one another. There appeared to be a tendency among students to find *common ground* with one another over a set of propositions on which they could agree (Clark & Brennan, 1991). Students sometimes used note starters in creative ways to achieve common ground, for example by writing "**My argument is...**I agree!" and then elaborating. In some cases, students even erased the note starters so that they could first note the points on which they agreed. The note starters may have interfered with the need of students to establish common ground, but students were not necessarily forced to use the note starters. As noted, students could select a note starter and then erase it if they wished to start a message in some other way. That was a strength of our intervention. Furthermore, the intent of the note starters was to encourage students to disagree as well as agree, and the note starters were highly successful in that regard. Before conducting this study, however, we did not fully appreciate the need of students for establishing common ground, and it might be important to explore, in the future, note starters that are designed to take this need into account. For example, because "I agree...but" was a common discourse move that we observed, future research might explicitly include "I agree...but" into the menu of note

starters. Allowing students some opportunity to forge agreement might, if done correctly, encourage disagreement because, as Sheldon argued, it mitigates the disagreement and helps to preserve harmonious social relations, thus making students more confident about disagreeing. There has been some analysis in the literature of computer-supported collaborate learning regarding the importance of building common ground around the meaning of terms and the goals of discussion (e.g., Baker , 1999), but grounding in conjunction with other devices (e.g., note starters) may also be important as a device for encouraging disagreement and greater reflection.

One device that did not appear particularly useful for engendering disagreement was our use of cases. Although some prior research (e.g., Vye et al.) found an effect of *video* cases on argumentative disagreements, our cases were neither visual nor as elaborate. Furthermore, more recent research suggests that some of the motivational effects found by Vye et al. may in part be due to the culture of the classroom (Hickey, Moore, & Pellegrino, 2001) and not just cases per se. On the other hand, we cannot discount the possibility that the use of cases may have had some other effect that was not specifically detected by our coding system. Clearly more research is needed here.

In general, the results reported here add to a growing body of literature on the role of individual characteristics in technological environments (Hartley & Bendixen, 2001). Notable were the role of personality-treatment interactions ("PTI's"), which supplement and extend prior research on cognitive variables, particularly aptitude-treatment interactions (ATI's). As summarized by Snow (1989), many ATI studies suggest that low-ability students often benefit from more structured learning environments than high-ability students; however, not all studies have produced ATI effects, suggesting the need

to examine other types of interactions (Snow, 1992), including personality interactions (Snow, Corno, & Jackson, 1996). This study has identified some key personality traits that enter into important PTI's and extended this work into technological environments. Students who are not open to ideas or assertive, or who are anxious, may benefit more from the structure afforded by note starters.

The study also produced some qualitative evidence regarding the importance of sociolinguistic practices (for example, prefacing disagreement with agreement) and we also suspect that social norms are another important variable moderating argumentation behavior, one that should be examined more explicitly in future research. Enhancing the quality of on-line discussion may require a synthesis of a number of theoretical perspectives (cognitive, affective, and sociolinguistic/sociocultural). For too long, varying conceptual perspectives have succumbed to rather nonproductive paradigm wars rather than recognizing that different conceptual perspectives may shed light on different, but important, aspects of an educational phenomena, such as argumentation (Reynolds, Sinatra, & Jetton, 1996). Therefore, working toward a synthesis of theoretical perspectives may not only help improve the quality of on-line discussions, but we hope also the quality of discourse on educational research as well.

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Table 1

Frequency of Agreement-Disagreement Codes

Code	Meaning	Frequency	Percent
1	Agrees-restates	172	55.5
2	Agrees-new idea	33	10.6
3	Qualified disagreement	73	23.5
4	Flat disagreement	32	10.4
5	Total	310	100.0

Table 2

Frequency of Agreement-Disagreement Codes by Condition

	Note starters			Case		
Code	With	Without	Difference	With	Without	Difference
1	76	96	-20	89	83	5
2	11	22	-11	21	12	9
3	39	34	5	35	38	-3
4	22	10	12	18	14	4

Table 3

Repeated Measures ANOVA for Note Starters and Cases

Source	df	F	η^2
	Between subjects		
Note Starter (NS)	1	4.062	0.099 *
Case (C)	1	1.599	0.041
NS X C	1	1.499	0.039
Error	37		
	Within subjects		
Question (Q)	1	0.876	0.023
Q X NS	1	4.598	0.111 *
Q X C	1	0.007	0.000
Q X C X NS	1	1.681	0.043
Error	37		

*p < .05 **p < .01 ***p < .001

Table 4

Final Hiearchical Regression Analysis for Variables Predicting Disagreement (N=310)

Variable	B	SE B	β
Note starters	1.398	0.306	1.476 **
Anxiety	0.008	0.006	0.087
Openness to ideas	0.017	0.007	0.189 *
Anxiety X Note starters	-0.036	0.011	-0.736 **
Openness to ideas X Note starters	-0.033	0.010	-0.672 **

Notes. $R^2 = .08$

*p < .05 **p < .01 ***p < .001

Table 5

Logistic Regression of Note Starters and Personality Characteristics on Disagreement (N=310)

Variable	B	SE B	Wald Critical Ratio
Note starters	8.678	1.839	22.257 ***
Ideas	0.077	0.037	4.335 *
Anxiety	0.051	0.034	2.283
Anxiety X Note starters	-0.171	0.054	10.201 ***
Ideas X Note starters	-0.140	0.051	7.434 **
Assertiveness	0.072	0.045	2.503
Assertiveness X Note starters	-0.134	0.061	4.807 *

Notes. $R^2 = .127$

*$p < .05$ **$p < .01$ ***$p < .001$

Figure 1. Note starter display condition.

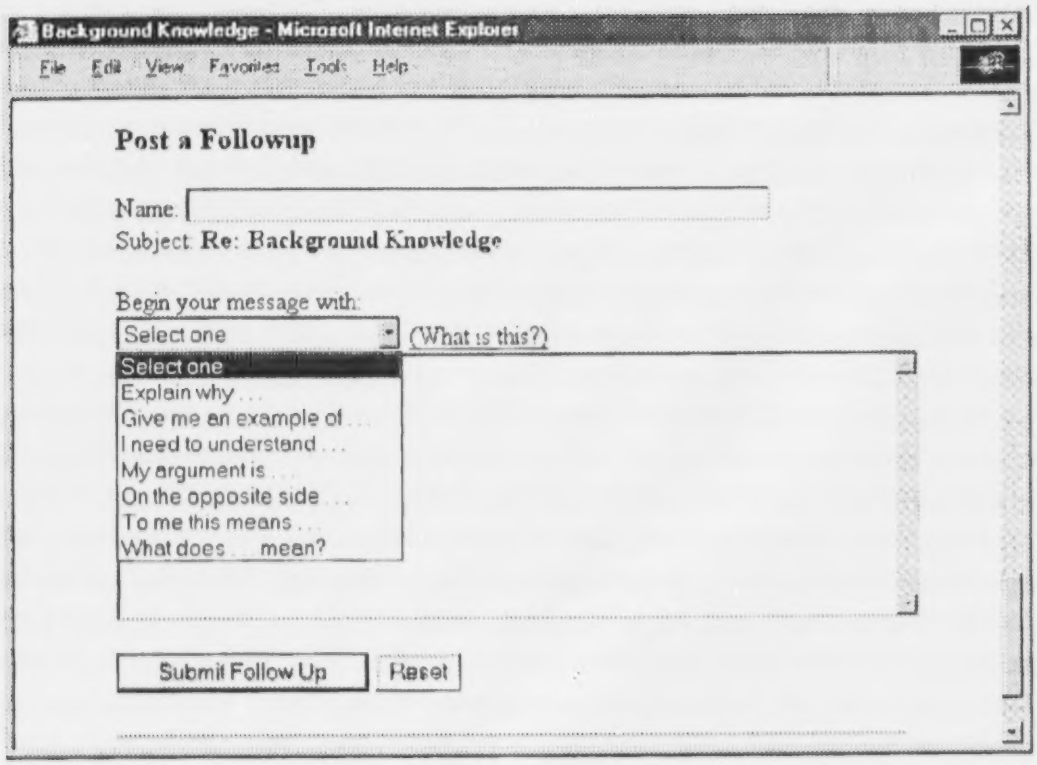

Background Knowledge - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Post a Followup
Name:
Subject: Re: Background Knowledge
Begin your message with:
Select one
(What is this?)
Select one
Explain why . . .
Give me an example of . . .
I need to understand . . .
My argument is . . .
On the opposite side . . .
To me this means . . .
What does . . . mean?
Submit Follow Up
Reset

Figure 2. Disagreement by anxiety with and without note starters

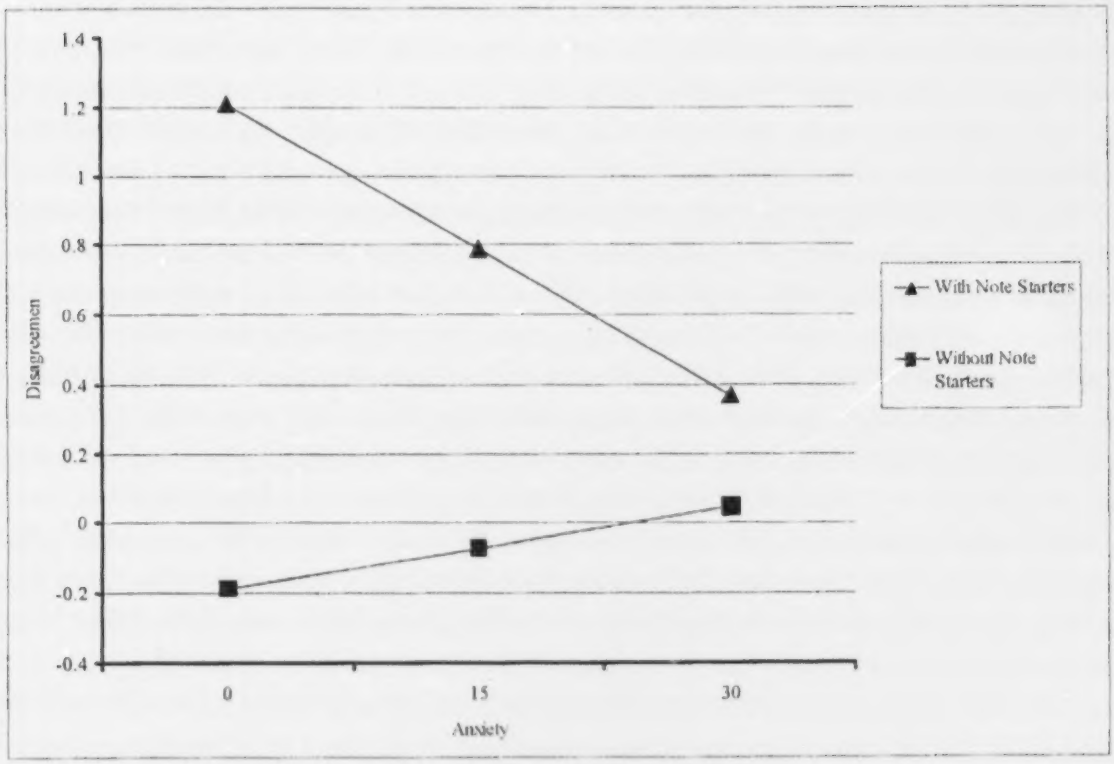
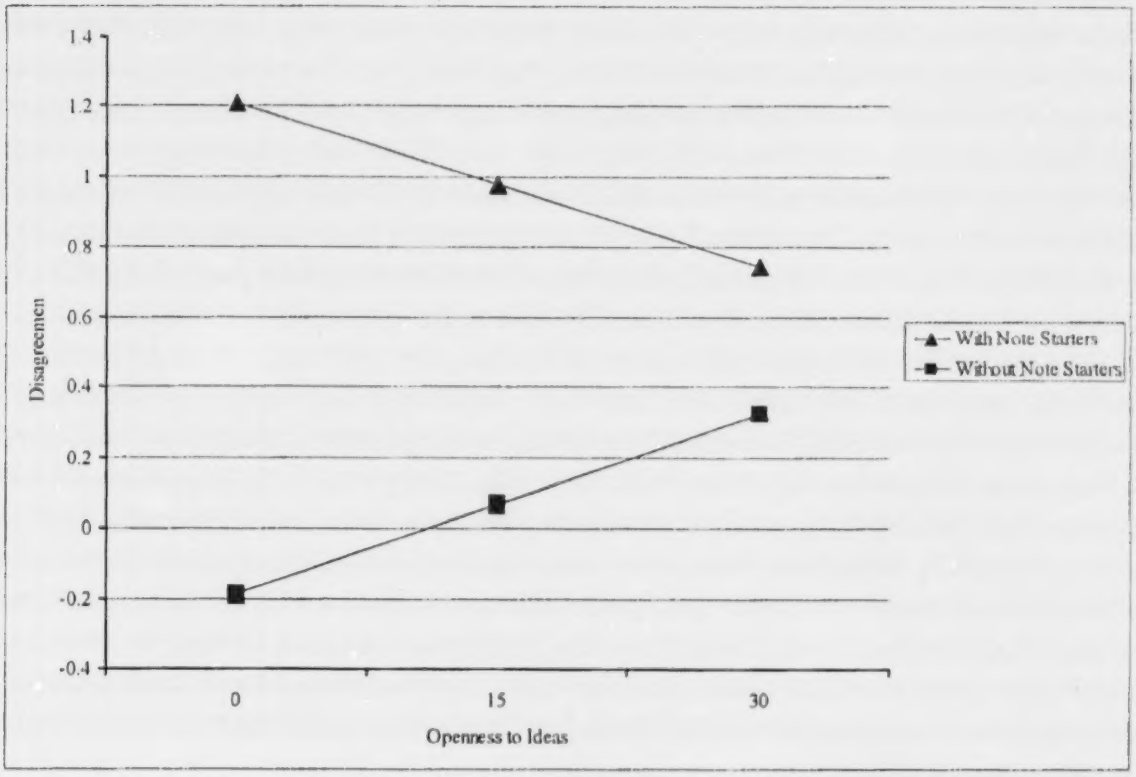


Figure 3. Disagreement by openness to ideas with and without note starters



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